

Saturated Media Extract Analysis

A Fertility Tool for Artificial Substrates

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The Saturated Media Extract is an analysis used as a tool in monitoring and maintaining the appropriate fertility levels of soilless artificial substrates. These substrates are very low in nutrient holding capacity and are desirable specifically for their suitable physical properties. They are implemented in potting mixes, container nursery production, and sand based golf courses and sports fields.

Artificial substrates can be composed of different proportions of sand, bark, peat, perlite, coir, and vermiculite. These materials' nutrient holding capacity extends only as far as their ability to retain water. Most nutrients that are retained in the substrate are readily soluble in water and few nutrients are held in reserve on the cation exchange and in insoluble complexes.

The Saturated Media Extract Method (SME) was developed in the 1970's at Michigan State University to provide a quick, inexpensive soil test for soilless media. No drying or screening of the samples is required and the large soil volume used in the test helps eliminate sampling error. Unlike traditional soil extraction methods, the interpretation of the SME results does not vary with soil density.

Soil pH is determined in the saturated paste. Salinity (ECe) and major and minor elements are determined in the saturation extract solution. Sodium and chloride are usually determined in order to get a complete picture of the soluble constituents.

Available metallic microelements are often quite low in the water saturation extract. In soils with appreciable compost, peat or bark, a dilute 0.005 M DTPA solution has been shown to consistently improve the extraction of micronutrients without affecting the extraction of the other parameters (Berghage et al. 1987).

Following are general criteria for the interpretation of SME data. Interpretation should take into account individual plant requirements and tolerance for pH, soluble salts and nutrients and growing objectives.



Table 1. General Guidelines for the Interpretation of Saturated Media Extract Method

Analysis	Units	Low	Acceptable	Optimum	High	Very High
pH		0-5.2	5.2-5.8	5.8-6.4	6.4-7.0	7+
Soluble Salts	dS/m (mS/cm)	0-0.75	0.75-1.5	1.5-3	3-4.5	4.5+
Nitrogen (NO ₃ + NH ₄)	ppm	0-40	40-100	100-200	200-300	300+
Ammoniacal Nitrogen	ppm		0-15	15-30	30-65	65+
Nirate Nitrogen	ppm	0-40	40-120	120-200	200-300	300+
Phosphorus	ppm	0-5	5-15	15-30	30-45	45+
Calcium	ppm	0-25	25-75	75-150	150-250	250+
Magnesium	ppm	0-15	15-40	40-75	75-150	150+
Iron	ppm	0-0.3	0.3-1	1-3	3-5	5+
Iron (DTPA) [†]	ppm	0-15	15-25	25-40	40-80	80+
Manganese	ppm	0-0.15	0.15-0.3	0.3-2	2-3	3+
Manganese (DTPA) [†]	ppm	0-5	5-15	15-30	30-60	60+
Zinc	ppm	0-0.1	0.1-0.2	0.2-0.4	0.4-1	1+
Zinc (DTPA) [†]	ppm	0-5	5-10	10-30	30-40	40+
Copper	ppm	0-0.01	0.01-0.1	0.1-0.3	0.3-0.5	0.5+
Copper (DTPA) [†]	ppm	0-2	2-5	5-20	20-30	30+
Boron	ppm	0-0.05	0.05-0.15	0.15-0.5	0.5-0.75	0.75+
Boron (DTPA) [†]	ppm	0-0.2	0.2-0.35	0.35-0.9	0.9-1.5	1.5+
Sulfur	ppm	0-20	20-50	50-100	100-200	200+
Molybdenum	ppm	0-0.01	0.01-0.05	0.05-0.1	0.1-0.25	0.25+
Chloride	ppm		0-30		80-200	200+
Sodium [‡]	ppm		0-80		80-150	150+
Aluminum [‡]	ppm		0-4		4-10	10+

Shaded columns indicate the “Preferred Range”.

[†] Elements extracted with 0.005 M DTPA.

[‡] Elements not considered nutrients.

References

Berghage, R.D., D.M. Krauskopf, D.D. Warncke, and I. Widders. 1987. Micronutrient testing of plant growth media: Extractant identification and evaluation. *Comm. Soil Sci. Plant Anal.* 18 (10): 1089-1110.

Recommended Soil Testing Procedures for the Northeastern United States. Northeastern Regional Publication No. 493. 3rd Ed. The Northeast Coordinating Committee for Soil Testing (NECC-1312) Revised July 1, 2011.